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CURRENT LITERATURE

BOOK REVIEWS

Injury by smoke

Dr. A. WIELER¹ has written a volume upon the effects on vegetation of sulfur dioxide, the most injurious constituent of smoke.² The subject of smoke injury to agricultural and forest crops has long been of importance in Europe, and is now beginning to attract attention in this country, where, with the extension of agriculture into semiarid mining regions and the increased interest in forestry, some means of restraining injury to crops or some basis for adjusting damages becomes more and more necessary.

The first chapter of the book is devoted to the demonstration of the presence of SO₂ in the leaves of plants injured by smoke. For this the author relies on the method of WINDISCH, which revealed the presence of SO₂ in leaves of ivy even 14 days after fumigation. Numerous analyses from smoky districts showed SO₂ in the leaves in varying amounts. The analyses do not show any definite relation between the amount of SO₂ present in the leaves and distance from the source of smoke.

In the second chapter it is shown that, contrary to the view of VON SCHROEDER and REUSZ, SO₂, like other gases, enters only through the stomata. Leaves whose stomatal surfaces were coated showed no injury when exposed for several hours to comparatively strong concentrations of the gas. In very young leaves and in leaves whose stomata are permanently closed, the gas penetrates the cuticle.

The third chapter, which takes up the greater part of the book, discusses the physiological effects of SO₂, which are so complicated in nature that all cannot be explained by the killing action of the gas on the tissues. Probably both its acid nature and its capacity for forming addition products with aldehydes in the tissues come into play. Two kinds of injury are distinguished, the acute and the chronic. The acute form is rare and occurs only in the immediate vicinity of the source of smoke, where the concentrations of SO₂ are sufficiently high to kill the tissues directly. Yet experiments on the resistance of various organs show that the concentration of gas necessary to produce the acute form of injury is much greater than that found in smoke-injured regions, and the great individual differences shown tend to obscure the results. To find an explanation of the chronic injury, which is the more common and more difficult to recognize and account for, the effect of dilute mixtures of the gas were studied. Even under uniform

¹ WIELER, A., Untersuchungen über die Einwirkung schwefliger Säure auf die Pflanzen. 8vo. pp. vii + 427. figs. 19. Berlin: Gebrüder Borntraeger. 1905. M12.

² The importance of this work justifies the publication of a review long after it was due.—EDS.

conditions respiration was found to be irregular. Photosynthesis was depressed, probably by the direct action of the gas on the chlorophyll, and not by a closing of the stomata (*Betula alba* and *Salix*); while transpiration is not depressed by the gas in any concentration. The rate of absorption of water is not reduced, the removal of the products of photosynthesis is delayed, and growth is retarded. In spite of all these effects of the gas, the author regards them as insufficient to account for the chronic injury. In a later chapter he reasons that the cause of the chronic injury must be sought in the effect of the gas on the soil, in which a condition similar to that present in cedar bogs is brought about. All the effects on trees point to a death by drouth.

Other chapters deal with the relation of soil conditions to the growth of trees, and with the resistance of various plants to smoke injury. Finally, the methods of determining smoke injury are discussed.

As a whole, the work is a record of careful experiments and observations on this very obscure subject. The great difficulty of properly diagnosing injurious effects due to smoke is repeatedly emphasized. Even in the carefully guarded experiments, the individual differences of different plants, as well as unfavorable factors due to the conditions of the experiments, often tend to obscure the effects of the dilute mixtures of the gases used. All this, however, has served to draw the author's attention to an important phase of the subject which has hitherto probably not been sufficiently considered, that is, the effect of the acids of smoke in the soil. Through changes induced by the continuous accumulation of SO_2 in the soil, the author believes that conditions are brought about which lie at the bottom of all the observed phenomena of smoke injury.—H. HASSELBRING.

MINOR NOTICES

Manual of micrography.—Dr. J. W. MOLL, professor of botany in the Royal University of Groningen, has prepared a manual³ for the use of beginners in laboratory practice in botany, which he believes is adapted not only to enable them to gain useful information by their own efforts, but also to train them in proper methods of scientific work. The book is the outgrowth of the author's experience, which has led him strongly to deprecate the use in the laboratory of books which tell the student what is to be seen. In the preface he sets forth his views vigorously on the pedagogics of botany, with special reference to the place of practical exercises.

The book is divided into three parts. The first gives a brief account of instruments, reagents, and materials; and the second gives directions for the analysis of microscopic structure and outlines for micrographic descriptions. The third part contains 489 exercises, which are scarcely more than lists of the material and preparations needed. Of course such exercises presuppose verbal

³ MOLL, J. W., *Handboek der botanische micrographie, ten gebruike bij de practische oefeningen voor aanstaande medici, pharmaceuten en biologen.* Small 8vo. pp. vi + 356. *figs.* 4. Groningen: J. B. Wolters. 1907. *fl.* 4.25.